CIRAD hybrid rice program: lower breeding costs and sustainability

Reciprocal recurrent selection assisted by a recessive genetic male-sterillity

R population (restorer)

B population (maintainer)

Reciprocal recurrent population improvement

Step 1: S_0 fertile (ms+) plants are selected and self-pollinated.

Step 2: Testcrosses of S_1 progenies. The S_1 male sterile plants are transfered to be outcrossed by the reciplrocal population.

Step 3: Evaluation of testcrosses in replicated yield trials.

Step 4: Recombination of selected S_1 progenies.

Each year 400 new R lines are extracted from the R population

Regularly new A lines are bred from the B population

POPULATION IMPROVEMENT BY RECURRENT SELECTION

? A better and faster use of the available germplasm.
? A constant accumalation of genetic progress.
? To avoid yield plateau.
? To progressively increase outcrossin ability (to facilitate seed production).
? To be completely independent of conventional inbred program

Every year 2000 hybrids are tested for seed production ability (SPA). 200 hybrids are selected for yield and grain quality evaluation

Best hybrids are progressively selected by SPA, yield and grain quality sucessive evaluations.

SEED PRODUCTION ABILITY FIRST SELECTION CRITERIA

(Only the hybrids which seeds are easy to produce are evaluated for agronomical value and grain quality)

Tall and late rice is used to isolate the seed production plots

USING A SINGLE SOWING DATE FOR A AND R LINES

? To lower the seed production costs.
? To lower the breeding costs.
? To evaluate a greater number of new hybrids.
? To get a better efficiency in the agromical evaluation (more seeds available).
? To facilitate mechanization (seed production and breeding trials).

UPLAND SEED PRODUCTION

? To facilitate mechanization.

? To lower the seed production costs.

Upland rice (Brazil Mato Grosso state)
Seed density 30 Kg/ha.
One same sowing date for A and R lines.
Mechanized seedling and harvesting.
Seed production cost: inferior to 1000 US$/ha.
Seed yield: between 900 and 1500 Kg/ha (without assited pollination).

EL ACEITUNO, EMBRAPA, FRONTEIRA, ASPAR and YAAS are institutions (public and private) associated to CIRAD to develop hybrid rice varieties through these processes

CIRAD

TAILLEBOIS James
james.taillebois@cirad.fr